Box 27 Folder 4

MacNeish

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HARVARD UNIVERSITY
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Four Harvard University botanists announced today new evidence concerning the origin of corn -- a question which has puzzled botanists for more than a century.

Their conclusions:

ONE - Corn, America's most important food plant, is definitely a native of this hemisphere and did not originate in Asia. Its North American history, the botanists established, goes back at least 60,000 years.

TWO - Corn is not a descendant of a Mexican grass called "teosinte," though the latter did have considerable to do in the development of modern corn through natural hybridization processes. Teosinte is really corn's closest relative and a contributor to its recent evolution.

It was also disclosed that synthetic hybrid corn cobs, produced through the laboratory mating of modern corn and teosinte, closely matched, in size and botanical characteristics, prehistoric corn cobs found in caves in the southwestern United States. The laboratory research was carried out at Harvard.

The Harvard botanists concerned with the research include Prof. Paul C. Mangelsdorf, Associate Professor Elso S. Barghoorn, Dr. Walton C. Galinat and Miss Margaret Wolfe of Radcliffe College.

Findings of the Harvard botanists were obtained by pooling

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discoveries and observations with those of climatologists and archeologists from many other colleges and museums. Among the latter was the National Museum of Canada, the Colorado State Museum and the National Park Service.

Evidence for corn's North American origin was obtained in the summer of 1953 with the finding of fossilized grains of corn pollen at a depth of more than 200 feet beneath Mexico City. The pollen fossils were discovered in drill cores studied by Dr. Paul Sears of Yale University and Mrs. Kathryn Clisby of Oberlin college. The latter are charting climatic fluctuations as related to changes in the kinds of pollen fossils. The pollen grains were first thought to be those of teosinte.

Definite determination that the fossil pollen grains were not teosinte, but corn, was made by Dr. Barghoorn and Miss Wolfe who have developed new labcratory techniques for distinguishing the pollen of corn from that of other grasses such as teosinte. The pollen grains are separated from the sediments of the core by chemical techniques and then studied under a microscope.

Dr. Barghoorn estimates on the basis of currently accepted glacial chronology, that the pollen is at least 60,000 years old. It thus antedates by many thousands of years the earliest evidence of agriculture or of man himself in this hemisphere.

It has been determined that the fossil pollen grains found at Mexico City had been blown into a large, slowly filling, lake which in glacial times occupied the present region of Mexico City.

Not only does the fossil corn pollen establish corn's American origin, it shows that basically corn has not undergone as great an evolutionary development as might have been expected. Photomicrographs of the corn pollen, compare quite favorably in

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size with the hybrid corn pollen of today.

(Another corn pollen find was made in 1953 far from Mexico City -- at Truro, Mass., near the tip of Cape Cod. This fossil pollen, which dates back an estimated 1200 to 1600 years, was found by Patrick Butler of Scituate, Mass., a Harvard graduate student. Butler found the pollen fossil about 108 inches below the surface of Smalls Swamp. It is indicative of New England maize cultivation far antedating the arrival of the early European colonists. The pollen size again compares quite favorably with that of modern maize.)

Other aspects of the mystery of corn, are also nearing solution as the result of researches by Harvard botanists, Dr. Mangelsdorf and Dr. Galinat. They have found primitive corn among prehistoric cobs dug up by archeologists from several long-abandoned caves inhabited milleniums ago by Indians.

In La Perra Cave in the state of Tamaulipas, Mexico, Dr. Richard MacNeish of the National Museum of Canada, turned up small cobs of a primitive corn regarded by botanists as the predecessor of a small-eared popcorn still grown by Indians in Yucatan and Campeche. The cobs are dated by radiocarbon determinations of associated plant remains at 2600 B.C.

The La Perra corn, the botanists believe, represents an agricultural type in the early days of domestication. It indicates that the people using it were probably in transition from a food-gathering to a food-growing status.

Even more primitive corn has been found by Drs. Mangelsdorf and Galinat among ancient cobs dug up in 1950 by Herbert Dick, then of the Colorado State Museum. This corn comes from Bat Cave in New Mexico and is dated at from 3000 to 3900 B.C., by radiocarbon estimates. Dick, in an earlier expedition in 1948 had found in

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Bat Cave the oldest and most primitive corn then known and in the more recent expedition turned up still smaller and more ancient specimens.

The small cobs of the Bat Cave corn, scarcely larger than a one cent piece, once bore about 50 tiny kernels. Remains of several kernels were found along with pieces of tassel, husks and pollen grains. From the combined vegetal remains it was possible to reconstruct the ancient corn plant from which they came. This, it would seem, was a short, slender plant (about a foot or two in height) bearing a few kernels at the base of the tassel and a miniature ear just below the tassel.

Although both the Bat Cave corn and La Perra corn in Mexico are primitive, they differ in a number of botanical characteristics. The botanists regard this as evidence that the two types were domesticated separately from geographically distinct races, one adapted to the lowlands and the other to the highlands. They suspect that there were additional races of wild corn in Central and South America, also.

The Bat Cave corn, according to Dr. Mangelsdorf, is the oldest and most primitive corn yet discovered. Although probably cultivated, it is not far removed from wild corn. Yet it has all of the botanical characteristics of modern corn except size.

"This ancient Bat Cave corn," Dr. Mangelsdorf stated, "proves beyond a reasonable doubt the ancestor of corn was corn and not, as some 19th century botanists have supposed, the wild grass teosinte."

(Teosinte has a corn-like appearance, with tassels and ears. The latter are borne separately and usually has five or six seeds enclosed in hard, bony shells. The grain is most unpromising as a food plant.)

Yet teosinte has played an important part in the evolution of

corn. Prehistoric cobs from other caves show evidence of the contamination of domesticated corn by teosinte. These evidences come from Cebollita Cave in New Mexico; from two caves at Montezuma Castle National Monument in Arizona and a cave in Chihuahua, Mexico. These caves were explored respectively by Reynold Ruppe of Harvard's Peabody Museum, Lloyd M. Pierson of the National Park Service and Robert Lister of the Colorado State Museum. In each case their research showed that "pure" corn had been succeeded by teosinte-contaminated corn.

Dr. Mangelsdorf has carried this further in the laboratory. By hybridizing corn and teosinte he has been able to produce synthetic types which match almost exactly the prehistoric cobs. More importantly, he discovered that crossing corn with teosinte caused the corn to mutate, greatly increasing its variability and the opportunity to shape it by human selection.

It now appears that though there are many questions still to be answered, the main features of corn's origin and evolution are clear.

"The American Indians," says Dr. Mangelsdorf, "apparently domesticated corn wherever they found it. Domesticated varieties originating from distinct geographical races soon hybridized to create new and more productive types. Still later corn crossed with teosinte. To new races resulting from this cross, teosinte contributed not only resistance to drought and diseases and the structural strength needed for the development of large plants and ears, but also mutability.

"All of these factors combined have speeded the evolution of corn to a point beyond that of perhaps any other cultivated plant. (Currently more than 200,000,000 acres of farmland are devoted to the cultivation of corn each year.) In less than 6000 years a small,

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wild grass bearing tiny ears no larger than a strawberry has evolved into one of the world's most productive cereals, a giant plant with monstrous ears.

"Corn's evolution," Dr. Mangelsdorf declares, "has truly been explosive.

"Now," he says, "that we know something of its past history we should be in a better position than before to shape its future evolution."

Some scientists have said that modern corn has just about reached the peak of its development. Further changes, they fear, may be of a deleterious rather than a helpful nature. With these views Dr. Mangelsdorf disagrees.

"We should," he says, "be making greater use of teosinte-contaminated races and eventually of teosinte itself in breeding new types of corn, more productive, more resistant to drought, diseases and insects. What nature has accomplished more or less by accident, the modern corn breeder ought to be able to do even better."

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